Does Urbanization Affect Bacterial Life Present in Soil? DSRP Jenny Wang & Saira Shah Dalton Science Research Program, The Dalton School, New York, NY **Dalton Science Research Program**

Introduction

- Urban vs. Suburban Soil: We compared soil from Central Park (urban) and Teatown Lake Reservation (suburban) to study the effects of human impact on soil ecosystems.
- **Central Park Microbes:** Central Park's soil hosts >160,000 microbial species—many newly discovered—that support plant health and nutrient cycling.
- **Teatown's Protected Soil:** With minimal foot traffic and conservation efforts, Teatown may offer a healthier, less disturbed environment, though may still be impacted by some runoff.
- Why Microbes Matter: Soil microbes are key for nutrient cycling, plant protection, and environmental health—making them crucial indicators of soil quality and ecosystem resilience.

Question

Due to increased exposure to human activity, does soil found in an urban environment contain more harmful bacteria than a sample from a suburban environment?





Sanger Sequencing

- - barcoding. Most samples had many gray/blank regions for each base pair, indicating low DNA sequence quality.
- Despite these limitations, we did obtain specific matches for a variety of bacterial species (Figure 2). • Many have overlapping traits, making it hard to determine their specific effects without further research.
- There is a potential difference in biodiversity between locations (Figure 1) • Urban soil had higher species evenness, suburban soil had higher species richness
- Urban soil had more CFUs (1,600,000) than suburban soil (140,000) (Figure 4). • Human foot traffic may bring in external bacteria to soil, which may have caused an increased CFU count
- Suburban soil had a significantly lower pH (6.85) than urban
- soil (7.45) (p=0.021, two-tailed t-test) (Figure 3). Runoff from city roads, e.g. salts, as well as poor drainage likely caused the increase in the city soil's pH
- Urban and suburban soils support distinct microbial communities, but that an urban setting may contain a greater abundance of bacteria due to human exposure.
- Changes to microbial communities/levels can have cascading consequences on the soil ecosystem.

Future Research

- Are microbial communities different in different regions of Central Park and Teatown Lake Reservation?
- Does human foot traffic drive microbial and soil changes at a meso and micro scale?
- Does urbanization have an impact on soil structure and nutrient levels & availability?

Acknowledgements

We want to thank Lisa Brizzolara and Andy Chen for their guidance, mentorship, and time they put into helping us with this project. We also thank the DNALC for providing reagents and guidance, and the Dalton School for facilities and equipment.

Discussion

• We encountered several limitations during sequencing: • Some samples did not have a pair and had to be self paired. Some had <200 base pairs which is suboptimal for